THE ASSOCIATION OF TEACHERS IN TECHNICAL INSTITUTIONS.

THE eighth annual conference of the Association of Teachers in Technical Institutions was held at the Central Technical School, Liverpool, during Whitsuntide, and was very successful from every point of view.

In the course of his presidential address Mr. P. Abbott reviewed the recent developments in educational and professional matters. He submitted that the education of the adolescent was the first problem of the century, and one closely associated with the future of technical education. The State must recognise its responsibility for the complete education of the youth; it had so far failed in its duty by bringing the education of the child to a dead end at the age of thirteen or fourteen. It was not with our elementary education that the fault was to be found. There must be an extension of the age of full-time instruction to fourteen or fifteen, followed by compulsory part-time instruction to eighteen or twenty, aided by compulsion on employers to diminish the hours of work to a corresponding degree. The Denman Bill now before Parliament would be welcomed as a step forward, giving, as it does, power to the local authority to extend the leaving age to fifteen, to compel attendance at continuation classes to sixteen, to restrict hours of child labour, and to restrict street trading for young people. The Bill was defective in its permissive qualities, but represented an advance in educational reform.

We were in the midst of a movement to free technical education from the thraldom of external examinations the results of which, as the President of the Board of Education had felicitously expressed it, might be called "snap-judgments." The true function of an examination should be *one* of several factors—attendance, home work, laboratory work, etc.—by means of which the teacher could satisfy himself that the pupil had worked satisfactorily through the course. It is not the examination that matters: it is the *course* that is all-important, and the training received during the course.

In an age of continuous progress and change it was essential that technical education should possess elasticity, flexibility, and adaptability. If teachers were expected to mould their work to the requirements of a cast-iron syllabus—such as obtained wherever external examinations prevailed—these properties could not exist.

It was to the credit of the Board of Education that it had taken the initiative by abolishing some of its own external examinations. Some remain, and it was difficult to see what good was obtained by their retention. Unfortunately, the abolition of the Board's examinations had induced the growth of certain unions of institutions so far beyond their original and ostensible purpose, that they were seeking to impose their systems of external examinations upon technical institutions and to deprive them of that freedom so necessary for the proper development of their work. The examinations of such bodies were the worst kind of external examinations; and these unions, which jealously exclude the practising teacher from their councils, had become the attractive centres of those who still cling to the fallacy that external examinations are an integral part of technical education. No system of external examination prevails in America, Germany, France, Austria, or Switzerland, and yet their technical education is so highly efficient that the results cause apprehension in our British industries.

Papers on internal examinations were read by Prof. Haldane Gee, and Messrs. Harrison, Bower, and Small. Mr. W. Hewitt, the director of technical education for Liverpool, read an interesting paper on a retrospective glance at the rise of scientific and technical education in England.

Resolutions welcoming the formation of the Teachers' Register and approving the report of the Departmental Committee on the superannuation of secondary and technical teachers were carried unanimously, as were those welcoming the Denman Bill, and advocating the formation of advisory boards composed of representatives of teachers, local authorities, inspectors, employers, and employees, to draw up courses of work, and to assist institutions in the conduct of their internal examinations.

DEVONIAN OF MARYLAND.[1]

THE three volumes before us comprise, in the first volume, an introduction on the general relations of the Devonian (67 pp.), an account of the Lower Devonian strata, their stratigraphy (122 pp.), and their palæontology (322 pp.), with descriptions of all the fossils, whether new or previously known.

The second volume treats of the Middle and Upper Devonian, the stratigraphy of the former occupying 114 pp. and its palæontology 224 pp. The Upper Devonian stratigraphy occupies 196 pp., and the descriptions of the fossils 165 pp. The third volume is filled with plates, seventy-three in number, showing all the species which have been found in the Devonian of Maryland.

It will be seen, therefore, that a large amount of space is given to the descriptions and figures of fossils. The stratigraphy is described from a purely scientific point of view; there is no chapter on economics, but perhaps that part of the subject is reserved for a special memoir.

The introductory chapter includes a section on the palæogeography of the Devonian in North America, with eight maps of successive phases, contributed by Dr. Ch. Schuchert, but this seems somewhat out of place; for the Appalachian portion of Maryland is very narrow, and includes but a very small part of the long Devonian outcrop in the range, so that as the author himself says, "if restricted to maps of the State, the palæogeography of Maryland would teach very little." In other words, the State does not furnish any basis for such restorations; moreover, Dr. Schuchert's method of restoring ancient lands and seas are very different from those employed in Europe.

The authors of this memoir review the classification of the Devonian in America; they divide the Lower Devonian into two stages, the Helderberg (limestones) and the Oriskany (sandstone and shale), this series being only about 700 ft. thick. The Middle Devonian consists mainly of shales, in three divisions—the Onondaga Shale, the Marcellus Shale, and the Hamilton Beds—the average thickness being 1600 ft. The Upper Devonian consists of two different types of sediment, a lower marine type, which they call the Jennings formation, and an upper "continental" type, called the Catskill formation. The former is composed of variously coloured shales and sandstones, and is from 4000 to 4800 ft. thick, the latter of red and grey standstones and shales, from 2000 to 3800 ft, in which no fossils have yet been found.

From the above it will be seen that the Appalachian Lower Devonian is a concentrated and largely calcareous formation, the Middle Series of a normal varied composition, while the Upper (though marine)

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[1] "Maryland Geological Survey." Middle and Upper Devonian. Text. Pp. 720+vi plates. Lower Devonian. Text. Pp. 560+xvi plates. Devonian. Plates xvii-lxxiii. (Baltimore: The Johns Hopkins Press, 1913.)

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must have been deposited near a large area of land. In this connection it is noticeable that beds of coraliferous limestone are repeatedly called "coral-reefs," without a tittle of evidence that they ever formed true coral-reefs.

Dr. Schuchert correlates the Lower Devonian fauna with that of the Konieprus Limestone (F^2) of Bohemia. It is rich in corals, echinoderms, bryozoa, and brachiopods, with a fair number of mollusca and trilobites. Most of the species are different from those of the European equivalent, and even the form hitherto known as *Pentamerus galeatus* is now distinguished as *coeymanensis*. The orthids, Dalmanella and Rhipidomella, are specially abundant in the Helderberg limestones.

In the Middle Devonian, corals and bryozoa are rare, and no echinoderms are found, so that the fauna has a different aspect from that of the European series, consisting chiefly of brachiopods and pelecypod mollusca, with a few gasteropoda, cephalopoda, and trilobites. It is noteworthy that Bactrites and Agoniatites make their appearance.

The Upper Devonian fauna is more interesting, not only because it includes species of Tornoceras and Bactrites, Buchiola and Styliolina, but also because some of the species are European, such as *Spirifer disjunctus*, *Atrypa reticularis*, *Buchiola retrostriata*, and *Schizophoria striatula*.

In conclusion, it may be mentioned that the figures of fossils are well executed, and that the whole work is creditably produced, though owing to the use of thick paper the volumes are very bulky and heavy. Such tomes may be liked in America, but in this country we prefer more handy and less weighty productions.

A. J. Jukes-Browne.

THE ROYAL OBSERVATORY, GREENWICH.

On Saturday last, June 6, the Astronomer Royal presented his report at the annual visitation of the Board of Visitors of the Royal Observatory. The report refers to the year commencing May 11, 1913, and exhibits the state of the observatory on May 10 of the present year.

Reference is first made to the new building, which has been erected in the magnetic enclosure in the park for the purpose of housing a set of modern instruments for recording the variations of the magnetic elements. The significance of the building consists in the fact that it is composed of a thickly walled outer room, containing an inner room well insulated by a considerable air-space, the constancy of the temperature of the latter being controlled by electric heaters regulated by a thermostat. After reference to the principal moveable instruments at the observatory or on loan from or to the observatory, we are informed that a silver-gilt inkstand presented to Sir G. B. Airy in 1852 by the River Dee Company has been presented to the observatory by his son, Mr. Osmund Airy. A portrait of Sir William Huggins has also been presented by Lady Huggins, and Sir William Christie has given one of himself.

Turning to the astronomical observations we find that with the transit circle the following observations have been made:—

Transits	16,423
Determinations of collimation and level error	311 and 632
Circle observations	16,455
Determinations of nadir point and reflection observations of stars (included in the number of circle observations)	607 and 417

With the altazimuth the following observations have been made:—

Meridian transits	1862
Meridian zenith distances	1031
Extra meridian observations	72
Determinations of collimation and level error	252 and 184
Determinations of nadir point ...	152

The travelling-wire micrometer has been used throughout the year for the determination of right-ascensions, and it is intended to replace the present eye end of the transit circle also by a travelling-wire micrometer which is now under construction.

The excess of the number of observations of R.A. in relation to those of N.P.D. is due to the inclusion in the working list of a number of faint and bright stars for comparison with the transit circle, and the determination of the magnitude equations of the observers with the latter instrument. The N.P.D.'s having been observed with the new printing micrometer, an interesting table is given of the comparison with Newcomb's catalogue for different periods.

The mean error in right ascension of the moon's tabular place for 1913 is given as −0·81s. from meridian observations and −0·87s. from extra-meridian observations of the moon's limb, and −0·81s. from meridian observations of the crater Mösting A. The transit circle gives 0·832s. Attention may be directed to the great increase in recent years of the mean tabular error of the moon's longitude. From 1883, when Newcomb's empirical correction was introduced into the Nautical Almanac, the values (all reduced to the same equinox) are:—

	″		″
1883	−0·03	1899	−2·18
1884	−0·16	1900	−2·69
1885	−0·09	1901	−2·77
1886	−0·11	1902	−3·15
1887	+0·21	1903	−3·08
1888	+0·76	1904	−3·16
1889	−0·38	1905	−5·29
1890	−0·27	1906	−5·91
1891	+0·72	1907	−5·96
1892	+0·79	1908	−5·97
1893	−0·06	1909	−6·41
1894	−1·20	1910	−7·85
1895	−1·47	1911	−8·34
1896	−1·68	1912	−9·79
1897	−2·77	1913	−11·8
1898	−3·03		

After a short reference to the observations made with the Cookson floating zenith telescope and the equatorial observations, mention is next made of the 28-in. refractor which has been employed on all known double stars showing appreciable relative motion, and a few other stars for special reasons. The measures have consisted of 105 pairs with separation less than 0·5″; 110 pairs with separation between 0·5″ and 1·0″; 123 pairs with separation between 1·0″ and 2·0″; 125 pairs with separation greater than 2·0″.

While the early publication of the mean results is communicated each year to the Royal Astronomical Society, the measures from 1893 to 1915 will be formed into one catalogue, each separate observation being given. This catalogue will contain 3000 double stars and notes on the more interesting stars.

The work with the Thompson equatorial has been confined to parallax and photometric determinations, the 26-in. refractor being used throughout. For the parallax observations an exposure of the same plate at two different epochs, approximately six months apart, is required. During the year the first exposure has been given to 292 plates, and a second exposure to 219 plates. The work of the measurement of these

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